

James Webb Space Telescope • 8 March 2006

JWST will be the premier space facility for astronomers in the coming decade. JWST is being designed as a versatile astronomy machine in the spirit of the Great Observatories, open to all astronomers through a peer-reviewed General Observer (GO) Program. More than 85% of its observing time will be allotted to the GO programs. Based on our experience with HST and the other Great Observatories, the GO program will engage the best of the astronomical community and likely produce unexpected yet fundamental breakthroughs. The great science that JWST will do is made possible by the considerable capability and versatility planned for the observatory, its instrumentation, and the Great Observatory operating model.

JWST will be used to explore all fields of astronomy. JWST's four important and timely science themes span the breadth of astronomy and guide the development of observatory requirements: first light and reionization; assembly of galaxies; birth of stars and protoplanetary systems; and the study of planetary systems (including our own) and the origins of life.

Finishing JWST should be NASA's top space astronomy priority. The preeminent position of JWST, and the top priority that NASA should place on completing it, should be highlights in the Astronomy Community's 2010 Decadal Survey. The international blue-ribbon committee (the "Science Assessment Team" or SAT) recently reaffirmed the scientific value of JWST, stating that since the formulation of the program in 1999, the case for the telescope and its unique capabilities has grown in strength and astronomical significance. With launch in 2013 and operations through 2018 and beyond, JWST will be the workhorse for the astronomy community in the next decade.

JWST technology development is on track. Strong emphasis is being placed on bringing critical systems to high technology readiness levels early in the program. Critical flight hardware is now complete. JWST's primary mirror has effectively been cast: the beryllium mirrors are all fabricated, as is the specialized production line to complete their figuring and polishing. The wavefront sensing approach has been successfully demonstrated on the Keck Telescope. All enabling technologies for the JWST mission are on track to meet test requirements for a NASA readiness assessment in January 2007.

JWST's current cost is appropriate for a 6.5-m space telescope. The year 2000 cost estimates for JWST (~\$1B for an 8-m telescope) did not include technology development (around \$230M), nor did they include work done at NASA centers (adds about ~20% to the cost under NASA's current accounting rules). Inflation to FY2006 dollars adds another 18%. JWST also incurred significant costs while the Ariane launch was debated in agencies external to NASA. With all these factors, JWST's cost estimate is now \$3.5B from the first day through launch. For comparison, the Hubble Space Telescope is \$4.1B in similar accounting (FY2006 dollars; full-cost accounting; no second-generation instruments, no servicing, no mission operations). JWST has gone through two replans, and has been judged independently to be as lean as possible while maintaining core capability in its science themes.

JWST is a cost-effective space telescope in terms of aperture. We have learned the lessons from HST and Spitzer. For example, using the metric of dollars per square meter of collecting area (all dollars FY2006, fully-costed) in units where HST is 1, Spitzer is 1.5 and JWST is just 0.2, even with JWST's innovative technologies (deployable beryllium mirrors, large deployable structures, and MEMS).

JWST is not driving current space science budget woes. The space science budget woes are a result of reprogramming from the science mission directorate to other parts of NASA. Dr. Griffin has been bluntly clear about that. He said in early 2006 in response to a question: *"I wish we hadn't had to [take two billion dollars from space science to complete the ISS], I didn't want to, but that's what we needed to do"* (<http://www.spaceflightnow.com/news/n0602/06nasabudget/>). The SMD line is being held effectively flat in the recent budget. A flat budget means decreased real spending power in the face of inflation, and drastically decreased spending power in the context of previous out-year planning exercises.

JWST is an international science project with broad US support. Scientists from dozens of national and international institutions are directly involved in the JWST development phase. JWST has major international participation for three of its four instruments, and launch will be on an Ariane 5. The JWST Project also has a wide-spread US industrial base with contractors in 24 states.